
The use of human mesenchymal stem cells encapsulated in RGD modified alginate microspheres in the repair of myocardial infarction in the rat.

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Public Summary:

The study demonstrates the use of a biopolymer as a scaffold to increase the function of stem cells.

Scientific Abstract:

The combination of scaffold material and cell transplantation therapy has been extensively investigated in cardiac tissue engineering. However, many polymers are difficult to administer or lack the structural integrity to restore LV function. Additionally, polymers need to be biological friendly, favorably influence the microenvironment and increase stem cell retention and survival. This study determined whether human mesenchymal stem cells (hMSCs) encapsulated in RGD modified alginate microspheres are capable of facilitating myocardial repair. The in vitro study of hMSCs demonstrated that the RGD modified alginate can improve cell attachment, growth and increase angiogenic growth factor expression. Alginate microbeads and hMSCs encapsulated in microbeads successfully maintained LV shape and prevented negative LV remodeling after an MI. Cell survival was significantly increased in the encapsulated hMSC group compared with PBS control or cells alone. Microspheres, hMSCs, and hMSCs in microspheres groups reduced infarct area and enhanced arteriole formation. In summary, surface modification and microencapsulation techniques can be combined with cell transplantation leading to the maintenance of LV geometry, preservation of LV function, increase of angiogenesis and improvement of cell survival.

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